SEQUENCE LISTING

<110> Owens, Gary K.
Mack, Christopher
Blank, Randall
University of Virginia Patent Foundation

<120> Compositions and Methods for Modulating Expression
Within Smooth Muscle Cells

<130> 021258-000500US

<140> US 09/807,757
<141> 2001-04-17

<150> US 60/105,330
<151> 1998-10-23

<150> WO PCT/US99/24972
<151> 1999-10-22

<160> 32

<170> PatentIn Ver. 2.1

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regulatory region 5' promoter and intron
genomic sequence

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<223> smooth muscle alpha-actin (SM alpha-A) gene
      5' promoter region

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      first intron sequence

<400> 8
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aaatgattgt agctccttag cttgcatgat ttcgtatcta aacgggacta aaaatgaatc 180
gtggtttact ggcaaaggag atggagagga aattaaagtt tgttcatgcg tggcatctgt 240
gaaatctgtt tacactaaac caactgctcg gatcccgcag cctactatag gggagaagtc 300
cagccatcta tggtaaatta tacatttgtt tctacttagg tgttggacac ttgtggattt 360
gtctatggtt cagacttagt gtgaggactt ccatctgac cgactacagc cgggttaact 420
ggaactggat gtcaggagtg aactggcgcg gttgcctgcg ctctggtttt ggctgagtgg 480
actgcgttgc ctctgggttt ccggggctct aacagtagac atgtatatct tgtgccctta 540
cgattcaaac ctatgtcatt ggtcatttgc agcaaagcat agctcctcta ctctctgcaa 600
agaaatgagg aagtgtctca ttcgggaagg atctgattgc gtttctctgc ctcaagtgtc 660
cctctggccc cttaggcaga atctctgtgg gagccacccc actcaggact tggtaacttc 720
tgcagggaaa cggagttttc tcgataagat tttcctcccc ttttgtgatt catgactaaa 780
tatggtttgc gttttgagac tcacaaactg gggaaggtta ctgtcctttc ctcctccctc 840
ccctcccctc ttacaattca tttttggcac aagatgagct ccactgtgct gcaccaaact 900
ccccggcctc gggtgcagtt ccaaaagcgg acgctggagc ccagtgtgtt ttacctaatt 960
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cacagcggca gtttcctctg gaaacacacc gacgtcttct ctagtgacga cgctcctttc 1080
aaagcttatt aagacatatt ttctggatat tttggatgaa gtagaaatac gtctttactg 1140
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ctaaggcaca accttaagtc atcctgccca acagtttatg tgggttatcc ttccccgttt 1260
tcaaagggca tcctaattcc gagtggttta tctcatttgc agcccggatg ctatgttttg 1320
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gaaaggaagc taaatataaa ttcagtgtct gaaagaagag gcagagtaga gagaggaaag 1500
agcaaaccaa ccaagatccc attttttccgt tcttgtgagg ggaacccagg cattgaagat 1560
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ggtaaagaca atagtcacat ggtgagatcg acaagcaatg cttgtacaat gcccttgatg 1680
tcccccgaag ctgtcgaaaa cacaagctta aatgtcaatt acttaaaatg ctattttaag 1740
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```
                                      6
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cccaaaagag tatgtgctca gttagtcaag gttagaagaa ataccagaac tcaggggagg 1800
aaaaaatatt ttaaaacctg atacttgcca cttccaaaga accccagtaa atattttgga 1860
gagaataagt aagctttggg ggtgagggag tggggggcaa ttcacttttt attacggtca 1920
tattaagttt ctttctgtaa cttatcagtc ttaagtaaga atagctatta tcatcctgtt 1980
gggttttcac aaactccccc atcaaaaatt ttcaatccaa tattttttac tagagtagga 2040
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cagagacaaa agattttct tttaaacatt taatatgagc aaacatttta acattctcat 2220
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aagtgacttt ggtttgatat agataacaaa ccttggtttg atatagataa caaacctttc 2340
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acctctcatc tgtgctctgt ggcctgttca cacactaatg ctctgccctg cttgagagtg 2460
gtaaaagagc ctgtgagctc ctgctctttg tgctgagggc ttgtggtgct aacctggaag 2520
tcagggtttc agctcatcaa aggccttaca gtctggtgaa agcatttcaa gataaagagt 2580
gttagttgag atctggggag agcgtccagc taaaataaca caacagggcc aagaaccctg 2640
gttgtggttg ggagtgaccg taggctccgg ccaaacgc                         2678


<210> 9
<211> 2719
<212> DNA
<213> Mus sp.

<220>
<223> smooth muscle alpha-actin (SM alpha-A) gene
      first intron sequence

<400> 9
gtaagtagcc ccagcccagg gatatgactt cgagttttcc caggctcttt tatcatccaa 60
tgtagccaga cattgtctgt gggaatctga atgactcacg tgtttgaat ttttgaataa 120
agatttatac tgttaaaatg attgtagctt tttagcttgc atgatttac atccgaatag 180
ggctgattta ctggaaacaa cgcttgattt actggaaaag gaaatggata gaaaattaaa 240
gtttgttcat gtgtgtcatc tgcaaaacct gtttacacta aaccaactgc tctgatcccg 300
cagcgtactg taggggtgga gtctagctgt atgtggtaaa ttatacgttt gtttctatta 360
ggcaaaagtt ggaaactttt ggatgtatca tgatgtagca tgaggtattt agtgcagctg 420
aggtaactgg aagtgaatat caggaatgaa ctgaggtagt tgcctgctct ctgatgttgg 480
ctgagtggac gcattgcttc tgggtttccg gggctctaag agctggtgtc ctatgctgga 540
aatgtgtatc ttgtgactgt gttggtgccc ttacaagtca gacctatgcc attggtcatt 600
tgcagcatag catagctttt ctactttctg caaagaaagg aggaagtgtc tcatccaggg 660
gagatctgat ttgcatttct ctgcctcacg tgtccctcag ccgcttaagt atctgtggaa 720
ccagccttgc caccccacat tgtaactcag ggctcggtag cttcatcagg gaatggagtt 780
ttctcgataa gattttcctc ctgttttgtg attcatgact aaatatggtt tgcatttgag 840
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tttcccattc ttgcaagggg aacacattga agatttcact ctgatcttgg ggacagggtt 1620
gaaagaaaac caagatcgca aacagaatct ttgggtaggg ataatagtta cttgatgata 1680
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atcaagctta gaagaagata ccagagctca gggaagaaaa aaagtctaca aaagctgatg 1860
cttgccactt caaaagaatc tagtaacatt tggacagaat aagtaagctt tgggtagagg 1920
aacaactcac attttattaa ggtcatatct gtctctttct gtaacttatc agtcttaaac 1980
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7

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aagaatagct ctcagcaacc tgttgggttt tcagcttaac agtgacttta ataaatgaag 2040
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tattagacca gctccttaac ttgtgatcct cctgcctcag cctccaagtg ctaggatata 2160
ggtgtacatc atcacaccca gccttgattc atatttaata cctcaccggc tcacaagtct 2220
ttagagccaa aagtttctc ttttaaacat ttaatatgag taaacatttt aacatttttca 2280
aattctcaca tgctgcccat tccttgaaaa tctacctttg gtgggggggg gggggggact 2340
atatatatat atgtccctat agaactctgc tctctacact gcatctctca tctgtgctct 2400
atgatctatt cacacactaa tgctctgacc agcttgagag tgttataaga gcctgtgaca 2460
ctcccgctct ttgtgctgag gacttgtggt gttaacctgg aagtcagggt ttcggatcat 2520
caaaggcttt acagcctagt gaaagcattt caagataaag ggtgttagtt gagaactgtg 2580
gagagcctcc agctaaaata acacaacagg accaagaacc ctgtctgtgg gtgggagtga 2640
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cctgagacgc tgctccagc                                                  2719
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<210> 10
<211> 2255
<212> DNA
<213> Gallus sp.

<220>
<223> smooth muscle alpha-actin (SM alpha-A) gene
      first intron sequence

<400> 10

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gtaagtggca ctgaaccaat agtgggattt atagttttct ggatgacttt aattaagtaa 60
tgtcacatgg aagctattca ggaggatgta ctgctatgct gcagtttgct taggcattac 120
ttactagaac tgaattggta aaatactttc aatgtctaca ctgagttgta tttgttttaa 180
agcacttttg aatgggaaat acgtctgatg attttgccga ttccaccaac actccaacgg 240
taatataaag acacagactg tttaatggca cagctggaat ttaagagaac ctgtgtgccc 300
ctgtggagtt agctttggac agaacagagt tcctgaatgg gtgaatttgc acactgtgta 360
gtggtttctc agcagctttg cttcagtgct ctcaaaatca gcttaaattg acgtaagtgt 420
tttggagtgt gactgcaaga agagctggaa gatgcaaaat agcagtatct aatcagatgc 480
aatgaggatg catgtgtatt cattgctgtc tcgatagata tgaaagctgt ggtctgcaaa 540
acgcccaata ttttattaaa gatcacatta tacacagagt tccttgtgag gctggagttg 600
ttctcctgat agcatgctgt agaggctggg gaagtgattg gttgtctttc agtgtaaagc 660
aggtagaagt aagaggctaa atactgtatt aattgctggg gtgaatatgt cctttattct 720
gcagtgtgag tgacttttgc tgctggagga tgttactact gcatgccatg gcagtccttg 780
agctgtaact cactccttgg aagagagtgt cctgcctgaa tgatttagct ttgattttta 840
gcttttttgtg ctctattact aaatatggtt ttcattagag tcctccaagc tagaaatgca 900
gcctttttcca gctccctcct ctcccctccc caagtgatt tttggcattg cattctctgc 960
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attgtactcc atagactaaa tgcttaaata taaagagcct gttttcccaa aagtttaaga 1140
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gcacgccagc aggcccatgg cagcaggttt tgatcgttcg cgaggagcca gctgggctgc 1500
tggatgacag cctgtctcgc tttggctgtt aacacattgc aatttgttga cctctgcatg 1560
gaagtccagg ctcccagcta gtcgagtgat tccctaacac actataaatt gtgggcaaat 1620
agttctcctc gagtgctggt attcggggct tgtttccgta attgactttta atacaaaccc 1680
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ttgattgcat tttaaagtca ggatatcatc tttctacgtg caccagtctt gtcaggatga 1920
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agtccagcag tcttctttat ctcccaccta cgcctcagtg gtggatttcc gtggccgaat 2040
ttagataaac attcgctgtc tcaaagctgt aatgatctgt ctttccatgc agcaggactg 2100
gaatagttcc atggagtact ttgaattatg tctggtgcat acagccttcc tgcctatcag 2160
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ttccttttat accgcattct ctgtcttaca gggtggttct ggtacctcac tttgttgttt 2220
ttttttcaat tattctttc ttgctgtttc catag                           2255


<210> 11
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:site-directed
     A mutant sequence, mutated CARG sequence CARG A,
     gel shift analysis oligonucleotide A mut

<400> 11
aattgtttaa                                                      10


<210> 12
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:site-directed
     B mutant sequence, mutated CARG sequence CARG B,
     gel shift analysis oligonucleotide B mut

<400> 12
ccctatatca                                                      10


<210> 13
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:site-directed
     Int mutant sequence, mutated CARG sequence
     intronicCARG, gel shift analysis oligonucleotide
     Int mut

<400> 13
aataattaaa                                                      10


<210> 14
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:CArG A
     oligonucleotide probe used in electromobility
     shift assay (EMSA), human and rat conserved cis
     regulatory element CArG A in smooth muscle
     alpha-actin (SM alpha-A) 5' promoter region

<400> 14
ttgctccttg tttgggaagc                                           20
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<210> 15
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:CArG B
     oligonucleotide probe used in electromobility
     shift assay (EMSA), human, rat and mouse
     conserved cis regulatory element CArG B in
     smooth muscle alpha-actin (SM alpha-A) 5'
     promoter region

<400> 15
gaggtcccta tatggttgtg   20

<210> 16
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:Intronic CArG
     oligonucleotide probe used in electromobility
     shift assay (EMSA), human, rat and mouse conserved
     cis regulatory element Int CArG in smooth muscle
     alpha-actin (SM alpha-A) first intron promoter region

<400> 16
ttttacctaa ttaggaaatg   20

<210> 17
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:PCR 5' primer
     complementary to E. coli Lac Z gene

<400> 17
gcatcgagct gggtaataag cgttggcaat   30

<210> 18
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:PCR 3' primer
     complementary to E. coli Lac Z gene

<400> 18
gacaccagac caactggtaa tggtagcgac   30

10

<210> 19
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Conserved
      region of Human AP1-like sequence

<220>
<223> Description of Artificial Sequence:human conserved cis
      regulatory element AP1-like in smooth muscle
      alpha-actin (SM alpha-A) first intron promoter region

<400> 19
tcatggacta aatatggttt gt   22

<210> 20
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:human conserved cis
      regulatory element GATA in smooth muscle alpha-actin
      (SM alpha-A) first intron promoter region

<400> 20
ttcaggttag agaggagctg   20

<210> 21
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:chicken conserved
      cis regulatory element CArG B in smooth muscle
      alpha-actin (SM alpha-A) 5' promoter region

<400> 21
aaggtcccta tatggttttg   20

<210> 22
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:mutated sequence
      for CArG B

<400> 22
ccctatatca   10

<210> 23
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:mouse conserved cis
      regulatory element CArG A in smooth muscle
      alpha-actin (SM alpha-A) 5' promoter region

<400> 23
ttgctccttg tttgggaggc   20

<210> 24
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:chicken conserved
      cis regulatory element CArG A in smooth muscle
      alpha-actin (SM alpha-A) 5' promoter region

<400> 24
ctgctccttg tttgggaggc   20

<210> 25
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:mutated sequence
      for CArG A

<400> 25
aattgtttaa   10

<210> 26
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:rat conserved cis
      regulatory element AP1-like in smooth muscle
      alpha-actin (SM alpha-A) first intron promoter region

<400> 26
tcatgactaa atatggtttg c   21

<210> 27
<211> 22
<212> DNA
<213> Artificial Sequence

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<220>
<223> Description of Artificial Sequence:chicken conserved
      cis regulatory element AP1-like in smooth muscle
      alpha-actin (SM alpha-A) first intron promoter region

<400> 27
tctattacta aatatggttt tc                                      22


<210> 28
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<220>
<223> Description of Artificial Sequence:mutated sequence
      for AP1-like

<400> 28
gaggaagtat                                                    10


<210> 29
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:chicken conserved
      cis regulatory element intronic CArG in smooth muscle
      alpha-actin (SM alpha-A) first intron promoter region

<400> 29
tatttcctaa ttaggaaatg                                         20


<210> 30
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:mutated sequence
      for intronic CArG

<400> 30
aataattaaa                                                    10


<210> 31
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:rat and mouse
      conserved cis regulatory element GATA in smooth muscle
      alpha-actin (SM alpha-A) first intron promoter region
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<400> 31
ttcaggttag ataagagttg   20

<210> 32
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:chicken conserved
     cis regulatory element GATA in smooth muscle
     alpha-actin (SM alpha-A) first intron promoter region

<400> 32
ttcaggttag ataacaattg   20